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**2012 Cardiovascular Risk Standing Review Panel**  
**Status Review for:**  
***The Risk of Cardiac Rhythm Problems and***  
***The Risk of Orthostatic Intolerance During Re-Exposure to Gravity***  
**Comments to the Human Research Program, Chief Scientist**

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2012 Cardiovascular Risk Standing Review Panel (SRP) Status Review WebEx/teleconference  
Participants:

**SRP Members:**

Michael Joyner, M.D. (chair) – Mayo Clinic  
Jason Carter, Ph.D. – Michigan Technological University  
Victoria Claydon, Ph.D. – Simon Fraser University  
Ralph Lazzara, M.D. – University of Oklahoma Health Sciences Center  
Gail Thomas, Ph.D. – The Heart Institute  
Michael Ziegler, M.D. – University of California, San Diego

**NASA Johnson Space Center (JSC):**

Ronita Cromwell, Ph.D.  
Craig Kundrot, Ph.D.  
Lisa Milstead, Ph.D.  
Steve Platts, Ph.D.  
Susan Steinberg, Ph.D.  
Laura Taylor, Ph.D.

**NASA Headquarters (HQ):**

Bruce Hather, Ph.D.

**NASA Research and Education Support Services (NRESS):**

Tiffin Ross-Shepard

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On December 13, 2012, the Cardiovascular Risk SRP, participants from the JSC, HQ, and NRESS participated in a WebEx/teleconference. The purpose of the call (as stated in the Statement of Task) was to allow the SRP members to:

1. Receive an update by the Human Research Program (HRP) Science Management Office (SMO) on the status of NASA's current and future exploration plans and the impact these will have on the HRP.
  2. Receive an update on changes within HRP (for example, movement of the IRP online, gap rewriting, etc.).
  3. Receive an update by the Element or Project Scientist on progress since the 2011 SRP.
  4. Participate in a discussion with SMO and the Element regarding possible topics to be addressed at the face-to-face 2012 SRP meeting.
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Based on the presentations and the discussion during the WebEx/teleconference, the SRP would like to relay the following information to Dr. Kundrot, the HRP Chief Scientist (Acting).

1. The SRP thinks the presentations were very informative and there seems to be several excellent projects the cardiovascular discipline is currently engaged in.
2. The SRP thinks there are now a number of studies in progress or possibly already completed that address the issue of gender differences, especially with regard to orthostatic intolerance. The SRP would like to be updated on the progress that has been made to identify and understand gender differences in the cardiovascular system response to microgravity, radiation, etc. at the next SRP meeting.
3. The cardiovascular discipline has initiated joint investigations with others to look at increased intracranial pressure and ocular dysfunction. These changes occur at the beginning of exposure to microgravity and may be the consequence of fluid shifts that ultimately lead to orthostatic intolerance at the end of spaceflight. The SRP encourages continued cooperation between these groups since the cardiovascular discipline has much to offer in this area and since a better understanding of fluid shifts on exposure to microgravity will provide the cardiovascular discipline a better understanding of the problem of orthostatic intolerance.
4. Recent studies reveal that astronauts continue to experience tachycardia six days after return from spaceflight. Some healthy individuals experience a prolonged tachycardia following prolonged bedrest in a syndrome called postural tachycardia syndrome (POTS). The syndrome is most common in menstruating females and is characterized by excess sympathetic output and tachycardia on standing. The SRP encourages the cardiovascular discipline to continue longer monitoring heart rate responses after spaceflight and after bedrest to see if some individuals are particularly susceptible to excess sympathetic nervous activity and tachycardia following deconditioning.
5. There is some evidence to suggest that the concept of "manifestation of previously asymptomatic cardiovascular complications" is controversial. Some suggest that these perceived risks are simply normal physiological adaptations associated with microgravity, and that they do not increase cardiovascular risk in spaceflight. However, there is very little knowledge about what influence long-term spaceflight is having on cardiovascular risk once the astronauts return from spaceflight, or how certain pre-/during/post-flight countermeasures play into future risk. The SRP thinks that this is a very legitimate concern, but when looking at the description of the Risk of Cardiac Rhythm Problems in the Integrated Research Plan, it seems to focus more heavily on cardiovascular complications during spaceflight. The SRP thinks that this needs to be broadened to focus more on cardiovascular disease manifestation after spaceflight.